



# FRD ACTIVITIES REPORT

## July - September 2015



### **RESEARCH PROGRAMS**

#### ***Project Sagebrush***

The comprehensive data report for Phase 1 of Project Sagebrush (PSB1) was published in July, 2015 (Project Sagebrush Phase 1, NOAA Technical Memorandum OAR ARL-268). It provides a detailed description covering all aspects of experimental design, instrumentation, measurements, quality control procedures, and the final database for the project.

The manuscript 'Revisiting the values of the horizontal plume spread parameters  $\sigma_\theta$  and  $\sigma_y$ ' is presently under review at the Journal of Applied Meteorology and Climatology. It covers some of the key findings of PSB1. A second paper 'An investigation into the magnitude and variation in the standard deviation of horizontal wind direction  $\sigma_\theta$ ' is in internal FRD review. Some of the discrepancies observed between PSB1 and some historical data are examined by comparing  $\sigma_\theta$  at numerous field sites by time of day and season. Tentatively, it has been found that the magnitudes of  $\sigma_y$  measured during PSB1 tended to be larger than those determined from earlier field studies and that the magnitudes of nighttime  $\sigma_\theta$  are much larger than those presently utilized in many existing modeling schemes. A third manuscript 'Empirical method for the estimation of the horizontal plume spread parameter  $\sigma_y$  based on results from Project Sagebrush Phase One' proposes a possible alternative for the determination of  $\sigma_y$ . It also addresses possible reasons for some of the discrepancies observed between PSB1 and historical studies. It is also in internal FRD review.

Intensive planning for the next phase of the Project Sagebrush field study will begin early in the first quarter of FY2016.

Bruce Hicks is still working on his analysis aimed at the parameterization of nighttime turbulence in the stable boundary layer. He reports achieving some insights when utilizing data from the Grid 3 area in combination with data from other sites. FRD continues to provide him with updated data sets from the Grid 3 tall tower. He recently requested some customized datasets for his analysis and work on preparing those datasets is in progress. ([Dennis.Finn@noaa.gov](mailto:Dennis.Finn@noaa.gov), Rick Eckman and staff)

#### ***Birch Creek Valley Wind Flow Study***

The U.S. Forest Service Fire Sciences Laboratory (FSL) has provided FRD with their final database of field measurements from the Birch Creek Valley Study in 2013. We have begun working with these data and integrating them with data collected by FRD and WSU. Part of that work includes creating a customized meteorological visualization package. A prototype of this package has been developed and should be completed early in the first quarter of FY2016. Preliminary analysis indicates strong evidence for a gap flow regime in the Birch Creek Valley. It is expected that the new visualization package will greatly enhance the ability to use the FSL data to identify the gap flow dynamics.

The manuscript 'Impacts of soil heat flux calculation methods on the surface energy balance closure' by Eric Russell, Heping Liu, Zhongming Gao, Dennis Finn, and Brian Lamb was published in the journal Agricultural and Forest Meteorology. This paper stems from measurements made by Washington State University during the 2013 collaborative field program. ([Dennis.Finn@noaa.gov](mailto:Dennis.Finn@noaa.gov), and Brad Reese)

### ***Wind Forecast Improvement Project (WFIP2)***

In late September, a FRD team deployed instruments at three WFIP2 locations in Oregon. The equipment includes a 915 MHz radar wind profiler, three minisodars, two surface-flux systems, and some additional surface observation systems. Most of the equipment was installed without incident. One exception was the radar profiler deployed at the Boardman airport, which was planned to be operated with a Radio Acoustic Sounding System (RASS) provided by ESRL. The combined profiler-RASS system can provide observations of both wind and temperature profiles. However, there have been difficulties in getting the profiler and RASS to interact properly. ESRL is looking for a solution to the problem. Data from the FRD deployment sites are being sent back to the office using cell-phone connections. ([Kirk.Clawson@noaa.gov](mailto:Kirk.Clawson@noaa.gov) and FRD staff)

Matthew Brewer started a postdoctoral position at FRD in late August after completing his Ph.D. at the University of Washington. His position supports WFIP2 and is administered through ARL's contract with Earth Resources Technology. Most of Matt's background has been in atmospheric modeling using the Weather Research & Forecasting (WRF) model and related modeling systems, and since arriving he has joined the WFIP2 Model Development team. But he has also been getting up to speed on the WFIP2 observations and was part of the field deployment team. ([Kirk.Clawson@noaa.gov](mailto:Kirk.Clawson@noaa.gov) and Rick Eckman)

The fiscal year 2016 plan for renewable energy research within OAR is undergoing revisions, and two tasks have been added for FRD's planned work. One task is for the field operation of the deployed equipment described above, which will extend through the entire year. The second task involves using the WFIP2 observations to evaluate NOAA forecast models, with an emphasis on forecasts of air-surface exchange and boundary layer development. ([Richard.Eckman@noaa.gov](mailto:Richard.Eckman@noaa.gov), Kirk Clawson, and Matt Brewer)

One of the sessions at the 2016 American Meteorological Society Annual Meeting hosted by the Seventh Conference on Weather, Climate, Water and the New Energy Economy will focus on overview papers related to WFIP2. FRD staff are co-authors on some of the presentations at this session. ([Kirk.Clawson@noaa.gov](mailto:Kirk.Clawson@noaa.gov) and Rick Eckman)

### ***ARL Convective Initiation Project***

FRD and ATDD have been working jointly on modeling aspects of the Convective Initiation project. Through the summer, Michael Buban at ATDD has been running a series of Large Eddy Simulations (LES) on NOAA high-performance computers to investigate how horizontal variations in surface heat fluxes affect convective initiation. The fluxes are varied in either horizontal bands or checkerboard patterns with different length scales. The simulations used nearly all of ARL's computing allocations through August but have been ramping down since then. An abstract describing the simulations entitled "The Simulated Effect of Surface Flux Heterogeneity on Convection Initiation in the Southeast US" has been accepted for presentation at the 2016 American Meteorological Society annual meeting. (Michael Buban, [Richard.Eckman@noaa.gov](mailto:Richard.Eckman@noaa.gov), and Tilden Meyers)

## ***HYRad***

The complete HYRad 2.0 has been formally released. As reported last time, the new user interface provides for creating multiple simultaneous source releases and the use of proxy isotopes to reduce model runtimes. The latest upgrades feature the use of compressed xml output files that encapsulate the model run status, summary, pdf, and plume outputs. This enables the visualization of plume animations and gives the user access to complete information used to configure the model run. The ability to smooth the plume output was also added to the interface. At the request of INL EOC hazardous assessment personnel, enhanced T-Roads (minor INL site roads) and facility locations, in addition to other minor changes, were also added to the interface. ([Brad.Reese@noaa.gov](mailto:Brad.Reese@noaa.gov), and Dennis Finn)

## **NOAA/IDAHO NATIONAL LABORATORY (INL) METEOROLOGICAL RESEARCH PARTNERSHIP**

### ***NOAA/INL Mesonet***

In September Rick Eckman attended a meeting in Idaho Falls of the Carbon Free Power Project (CFPP) and gave a brief presentation on FRD's permanent tower network and other measurement capabilities. CFPP is an effort by Utah Associated Municipal Power Systems, NuScale, and Energy Northwest to install modular nuclear reactors at the Idaho National Laboratory (INL) Site. They are proposing to install 12 of NuScale's small modular reactors to generate about 570 MW of power. It is not clear whether the Department of Energy will ultimately allow CFPP to move ahead with their plans. If it does proceed, FRD may become involved to the extent that the division already has existing meteorological observations near the proposed construction sites. ([Richard.Eckman@noaa.gov](mailto:Richard.Eckman@noaa.gov))

A Campbell Scientific CR6 datalogger is being tested as a potential replacement for the aging CR23X dataloggers currently used in the NOAA/INL Mesonet. It was operated for several weeks on a test weather station installed just outside the FRD office and appeared to operate without any problems. As soon as the WFIP2 deployment is completed and personnel are once again available, the datalogger will be installed at one of the NOAA/INL mesonet stations to test its RF communication abilities within the NOAA/INL Mesonet. We have also received three Esteem radio modems that will be tested as potential replacements for the radio communication system currently used in the mesonet. ([Roger.Carter@noaa.gov](mailto:Roger.Carter@noaa.gov), and Shane.Beard)

### ***Emergency Operations Center (EOC)***

On July 22, 2015, FRD provided "canned" weather data for an emergency response drill. The data was provided in a set of special files that could be displayed on the standard weather display software used by the emergency response organizations and also used by the HYRad. ([Roger.Carter@noaa.gov](mailto:Roger.Carter@noaa.gov))

Team B had a drill at the EOC on July 22, 2015. The drill was centered on a transportation incident at INTEC. Nowcasts and short term forecasts were provided using the "canned" weather described above. The HYRad model was operated for personnel evacuation support.

Team C was involved in a drill at the EOC on July 29, 2015. This drill centered on a vehicle accident at RWMC. Nowcasts and short term forecasts were provided. The HYRad model was also run during the drill.

Team A had a drill in the EOC on September 23, 2015. The drill was centered on a forklift accident at SMC in which several injuries occurred. Nowcasts and short term forecasts were given. Plume plots from HYRad were not needed during the drill.

Team D had a drill at the EOC on October 6, 2015. This drill also centered on a transportation accident at ATR. Nowcasts and short term forecasts were provided. No HYRad plume plots were needed during the drill.

### ***INL Hazardous Weather Alert System***

The NOAA INL Weather Center issued 13 hazardous weather alerts for the INL last quarter. Nine of the alerts were issued for lightning and 4 were issued for high winds.

### ***Sage Grouse Habitat Protection***

Discussions on sage grouse habitat protection were held in August with personnel from Gonzales-Stoller Surveillance, LLC. This group manages the INL Environmental, Surveillance, Education and Research Program. The NOAA/INL Mesonet tower at Rover has become an object of convenience for nesting ravens. Ravens are predators of sage grouse and eat their eggs. With the Rover tower being the only high place for miles around (no trees and power poles are nearby), and being an easy location for sage grouse nest surveillance, ravens have established a nest in the top of the Rover tower. The roosting ravens are also making a mess of the area and have caused some minor damage to instrument cabling. Our discussions with GSS centered on placing some type of barrier inside the tower to prevent nest-building in the future. We have constructed a device that will be installed later this year on the Rover tower that will permit human access to the instruments on the tower, but that will also hopefully prevent the ravens from returning. If this device is successful, we will build and install it on other towers that are similarly impacted, such as Cox's Well.

## **OTHER ACTIVITIES**

### ***Safety***

The FRD staff viewed the video "Avoiding Bugs in Summertime" during the July staff meeting.

Shane Beard showed a video on fall protection by CC Health Production during the August staff meeting.

During our September staff meeting, Donna Davis shared "Fall Season Safety Tips" with the staff.

### ***Travel***

Kirk Clawson traveled to various proposed instrument deployment sites in Oregon, June 29 – July 1, in preparation for the WFIP2 Project.

Kirk Clawson attended the EMI SIG Annual Meeting in Shepherdstown, WV July 6-10.

Kirk Clawson, Tom Strong, Shane Beard, and Matt Brewer traveled to the three FRD instrument deployment sites in Oregon and installed all the equipment for the WFIP2 Project.

### ***Training***

All federal employees and contractors completed the required INL General Employee Training.

During the 4<sup>th</sup> quarter, all federal employees finished the required training: “Ensuring Accurate and Complete Time and Attendance Recording”.

The 2015 NOAA IT Security Awareness Course was completed by all federal employees and contractors.

Kirk Clawson, Richard Eckman, and Donna Davis completed the 2015 DOC Purchase Card Refresher training in July.

Eric Johnson, Attorney-Advisor with DOC OGC, provided ethics training on August 5<sup>th</sup> for the FRD staff.

Kirk Clawson completed the training module “CAPS Performance Appraisals” via webinar, offered by WFMO/HR.

### ***Miscellaneous***

Jumpoff Peak lease was renewed for another 5 years. This lease now expires in September 2020.